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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/696,220	10/26/2000	Masafumi Kokura	925-165	4305

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EXAMINER

AUGHENBAUGH, WALTER

ART UNIT	PAPER NUMBER
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1772

DATE MAILED: 10/04/2002

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/696,220

Applicant(s)

KOKURA ET AL.

Examiner

Walter B Aughenbaugh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because: the abbreviation "TFT" should be written out in full, "MoN" should be written out in full "N2" should be replaced with "nitrogen", the phrase "prevent decrease in etching rate" (lines 13-14) needs to be clarified- a decrease in relationship to what and the etching rate of what? The phrase "used to perform two exposure so that... TFT" (lines 6-9) needs to be clarified. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In regard to claim 1, the term "patterned substrate" is indefinite since the structure intended to be recited from the term "patterned" is not clear. The claim should positively set forth the purpose of the "patterned substrate" and the structure necessary for carrying out the purpose, i.e., the claim is incomplete in regard to the structure of the "patterned substrate" intended to be recited from the term "patterned". Furthermore, the phrase "at least on a side of the metal film which is in contact with the insulating film" is indefinite. The structure intended to be recited by this phrase is not clear. The "side of the metal film" being referred to is not clear. Is the phrase "which is in contact with the insulating film" qualifying the metal film or the

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molybdenum nitride film? The structural relationship between the three films, especially in regard to the location of the molybdenum nitride film, is not clear.

In regard to claim 2, "forms" should be replaced with "is" to definitely establish that the metal film is an electrode.

In regard to claim 4, the phrase "also serves as a support substrate" is indefinite. The word "also" is unnecessary and confusing. The phrase "serves as" is an intended use phrase that is not given patentable weight, since it has been held that a recitation with respect to the manner in which a claimed article is intended to be employed does not differentiate the claimed article from a prior art article satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQd 1647 (1987). The phrase "support substrate" is indefinite because the claim should positively set forth the purpose of the "support substrate" and the structure necessary for carrying out the purpose, i.e., the claim is incomplete in regard to the structure of the "patterned substrate". No additional structure is recited which distinguishes the "insulating film" from a "support substrate". Any film would be considered a "support substrate" unless structure is recited for the "support substrate" which distinguishes the "support substrate" from any other film such as the "insulating film".

In regard to claim 6, the scope of the claim in regard to the structure of the liquid crystal display cannot be ascertained. Claim 6 is incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationship is: the relationship between the liquid crystal display and the patterned substrate.

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In regard to claim 7, the phrase "is formed by laminating an insulating film and a molybdenum nitride film on the substrate" is a process limitation and has not been given patentable weight because the method of forming the liquid crystal display is not germane to the issue of patentability of the liquid crystal display itself. Furthermore, the structure intended to be recited by this phrase is indefinite. The phrase is incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. The omitted structural cooperative relationship is: the relationship between the insulating film, the molybdenum nitride film, the reflective metal film and the substrate- which of the insulating film or the molybdenum nitride film is in contact with the substrate? Which of the insulating film or the molybdenum nitride film is in contact with the reflective metal film? The phrase "obtained by dividing the liquid crystal layer into a plurality of segments" is a process limitation and has not been given patentable weight because the method of forming the liquid crystal display is not germane to the issue of patentability of the liquid crystal display itself. Insufficient structure is claimed for the pixel regions: the claim should positively set forth the purpose of the "pixel regions" and the structure necessary for carrying out the purpose, i.e., the claim is incomplete in regard to the structure of the "pixel regions".

In regard to claim 9, the functional language phrase "the reflective metal film serves as an electrode for applying a voltage to the liquid crystal layer" is indefinite because the structure required is not recited. Does the reflective metal film touch the liquid crystal layer or is there an intermediate component/s linking the metal film to the liquid crystal layer? No structure is recited as to the structure necessary for the application of voltage to the liquid crystal layer by

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the metal film; the phrase is incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections.

In regard to claim 10, the structural relationship between the indium tin oxide film and the substrate and between the indium tin oxide film and the reflective metal film is not clear.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 1, 2, 4 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Kurogane et al.

In regard to claim 1, Kurogane et al. teach a thin film transistor with layer 8 of an Al alloy metal film, layer 9 of an N-containing Mo film and an insulating film 6 (col. 6, lines 3-7 and Figure 1). Insulating film 6 is adjacent to Al alloy metal layer 8, and the N-containing Mo film is on a side of the Al alloy metal layer 8 (Figure 1).

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In regard to claim 2, the Al alloy metal layer 8 and the N-containing Mo film form an electrode line 10 (col. 6, lines 3-7 and Figure 1).

In regard to claim 4, Kurogane et al. teach that the protective layer 11 is deposited over the entire surface of the substrate so as to cover the electrode lines 10 (col. 7, lines 18-21 and Figure 4A). Since protective layer 11 is in contact with insulating film 6, Kurogane et al. teaches insulating film 6 to be a part of the substrate.

In regard to claim 6, Kurogane et al. teaches that the electrode lines 10 are provided on a substrate of an liquid crystal display (LCD) (col. 9, lines 13-15).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurogane et al.

Kurogane et al. teach the thin film transistor as discussed above. Kurogane et al. fail to teach that the molybdenum nitride film has a nitrogen content between 5 atomic % and 30 atomic

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% inclusive. However, Kurogane et al. teach the variation of ratio of flow rate of N₂/Ar during the Mo film deposition in order to vary the resistance of the N-containing Mo film (col. 4, lines 51-62 and col. 8, line 63-col.9, line 3). One of ordinary skill in the art would have recognized to tailor the nitrogen concentration in the N-containing Mo film via variation in the processing parameters during nitrogen deposition into the Mo film in order to achieve the desired properties, such as resistance, for the desired end-use results.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have tailor the nitrogen concentration in the N-containing Mo film via variation in the processing parameters during nitrogen deposition into the Mo film, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art in the absence of unexpected results. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurogane et al. in view of Mitsui et al.

Kurogane et al. teach the thin film transistor as discussed above. Kurogane et al. fail to explicitly teach that the insulating film is composed of a polymeric resin. Mitsui et al., however, teach a liquid crystal display device with an insulating film composed of high molecular resin (col. 5, lines 14-16). Therefore, one of ordinary skill in the art would have recognized to have used a high molecular resin (i.e. a polymeric resin) as the insulating film material of Kurogane et al., since polymeric resin is a notoriously well known insulating film material, as taught by Mitsui et al.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a high molecular resin (i.e. a polymeric resin) as the insulating film

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material of Kurogane et al., since polymeric resin is a notoriously well known insulating film material, as taught by Mitsui et al.

9. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsui et al. in view of Kurogane et al.

Mitsui et al. teach a liquid crystal display device having a liquid crystal layer 49 interposed between substrates 31 and 45 (col. 10, lines 13-17 and Figure 5). Mitsui et al. also teach that the liquid crystal display device has reflection electrodes 38 that are composed of aluminum formed on insulating film 42 (col. 9, lines 65-68 and Figure 5). Mitsui et al. fail to teach a molybdenum nitride film laminated on the insulating film and that the reflective metal film is provided in pixel regions obtained by dividing the liquid crystal layer into a plurality of segments. However, in regard to the molybdenum nitride film limitation, Kurogane et al. teach that the deposition of a molybdenum film onto an aluminum film prevents corrosion that occurs during deposition of an indium tin oxide film when portions of the aluminum film exposed to the indium tin oxide film via the contact hole running through the insulating film is oxidized by the oxygen atmosphere in a deposition apparatus (col. 1, lines 40-46). Kurogane et al. further teach that the addition of nitrogen to the molybdenum film minimizes the amount of shift of the molybdenum film with respect to the aluminum film during etching (col. 35-42). Kurogane et al. teach that indium tin oxide film is deposited on the protective layer 11 and then patterned to form the pixel electrode 13 (col. 7, lines 26-28 and Figure 1 and 4B). Therefore, one of ordinary skill in the art would have recognized to have formed a nitrogen containing molybdenum film between the insulating film 42 and reflection electrode 38 of Mitsui et al. in order to prevent corrosion that occurs during deposition of an indium tin oxide film at the contact hole running

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through the insulating film and to minimize the amount of shift of the molybdenum film with respect to the aluminum film during etching as taught by Kurogane et al.

In regard to the limitation that the reflective metal film is provided in pixel regions obtained by dividing the liquid crystal layer into a plurality of segments, Kurogane et al. disclose that a LCD matrix substrate is provided with a plurality of thin film transistors (col. 5, line 53 and item 100 of Figure 1) arranged in a matrix, a plurality of ITO (indium tin oxide) pixel electrodes that each correspond to one of the thin film transistors and an aluminum conductive layer (col. 1, lines 13-17). Therefore, one of ordinary skill in the art would have recognized to provide the reflective metal film taught by Mitsui et al. in pixel regions, since Kurogane et al. disclose that it is notoriously well known that a LCD matrix substrate is provided with a plurality of thin film transistors arranged in a matrix, each thin film transistor unit with corresponding electrodes constituting a pixel region.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed a nitrogen containing molybdenum film between the insulating film 42 and reflection electrode 38 of Mitsui et al. in order to prevent corrosion that occurs during deposition of an indium tin oxide film at the contact hole running through the insulating film and to minimize the amount of shift of the molybdenum film with respect to the aluminum film during etching as taught by Kurogane et al.

In regard to claim 8, Mitsui et al. and Kurogane et al. teach the liquid crystal display device as discussed above. Mitsui et al. and Kurogane et al. fail to teach that the molybdenum nitride film has a nitrogen content between 5 atomic % and 30 atomic % inclusive. However, Kurogane et al. teach the variation of ratio of flow rate of N_2/Ar during the Mo film deposition in

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order to vary the resistance of the N-containing Mo film (col. 4, lines 51-62 and col. 8, line 63-col.9, line 3). One of ordinary skill in the art would have recognized to tailor the nitrogen concentration in the N-containing Mo film via variation in the processing parameters during nitrogen deposition into the Mo film in order to achieve the desired properties, such as resistance, for the desired end-use results.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have tailor the nitrogen concentration in the N-containing Mo film via variation in the processing parameters during nitrogen deposition into the Mo film, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art in the absence of unexpected results. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

In regard to claim 9, Mitsui et al. and Kurogane et al. teach the liquid crystal display device as discussed above. Mitsui et al. and Kurogane et al. fail to explicitly teach that the reflective metal film serves as an electrode for applying a voltage to the liquid crystal layer. However, Mitsui et al. disclose that voltage is applied for display to the reflection electrodes 38 (col. 20, lines 42-45). Since Mitsui et al. disclose that voltage is applied for display to the reflection electrodes 38, one of ordinary skill in the art would have recognized that the voltage is applied to the liquid crystal layer via reflection electrodes 38, because the application of voltage to the liquid crystal layer is essential for display.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied voltage to the liquid crystal layer via reflection electrodes 38 as taught by Kurogane et al., because the application of voltage to the liquid crystal layer is essential for display.

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Conclusion

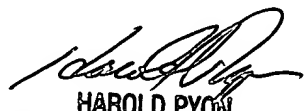
10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. 6,043,859 to Maeda.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter B Aughenbaugh whose telephone number is 703-305-4511. The examiner can normally be reached on Monday-Friday from 9:00am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached on 703-308-4251. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

wba
09/26/02


HAROLD PYON
SUPERVISORY PATENT EXAMINER
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